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Herpetofauna Kakamegensis – The amphibians and reptiles of Kakamega Forest, western Kenya

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Abstract. We present an annotated checklist of the herpetofauna of Kakamega Forest with comments on the biology and systematics of the taxa. Twenty-five amphibian, one turtle, 22 lizard and 36 snake species are recorded from within the forest and its immediate environment. We discuss the generalized zoogeography of the forest and distribution pattern of the taxa comment on the protection of the forest. Analysis of the reptile species composition shows Kakamega Forest to be similar to the Guinea-Congolian rainforest and is considered the easternmost remnant of this forest block. Kakamega forest has a high diversity value for Kenya and represents a diversity hotspot on a national scale. Two species, *Lygodactylus gutturalis* and *Psammophis phillipsi*, are recorded in Kenya for the first time. Several other first records and the description of a new species (Agamidae: *Agama finchi*) were published already separately.

Keywords. East Africa, Kenya, Kakamega Forest, herpetological survey, checklist, national diversity hotspot.

1. INTRODUCTION

In Africa tropical rainforests extend from southern Senegal in the west to the coastal forests of Kenya and Tanzania in the east (Collins 1992). The East African rainforests belong to different biogeographical clades. Apart from the mountain forests and inselbergs, which are not clearly assignable, there are three important forest types: the coastal forests and the Eastern Arc mountain forests, both with a high degree of endemism, and the easternmost outliers of the Guinea-Congolian rain forest. The Eastern Arc Mountains were already the object of several biological studies and have recently been reviewed in respect to their herpetofauna by Howell (1993). The value of the coastal forest biodiversity was underestimated for a long time. Recently the herpetofauna of the Kenyan part of the coastal forest was surveyed by the Kifcon project (Kifcon 1995). Only the forests associated with the Guinea-Congolian forest (e. g. Budongo, Bwamba, Kibale, Bwindi, Mbira and Mt. Elgon in Uganda) are at least partly explored. Herpetological inventories have been made for the Bwindi (Drewes & Vindum 1991) and Kibale Forests (Vonesh 2001). All together these forests harbour an estimated number of 333 amphibian (Duellman 1993), 105 snake (Hughes 1983), 95 lizard, 16 turtle and 3 crocodilian species (Bauer 1993). This total herpetofaunal species richness is more than 550. Considering the fact that zoological research in Africa is becoming more and more difficult because of the political instabilities in numerous countries, this number is certainly too low. Because tropical forests in Africa are seriously threatened numerous undescribed species may become extinct before their discovery and scientific descriptions. Uganda, for example has lost 86 % of its original forest in the past two decades and the remaining parts are isolated fragments (Vonesh 2001).

Kakamega Forest in western Kenya is a similar isolated fragment. This small forest is the easternmost fragment of the equatorial rain forest system (Clausnitzer 2005; Drewes 1976; Hamilton 1976; Köhler 2004; Kokwaro 1988; Schiotz 1976; Vonesh 2001; Wagner et al. submitted; Zimmermann 1972) and has recently been surveyed in regard to its faunal communities by the 'Biota East Africa Project' and especially to its amphibian fauna by e. g. Schick et al. (2005) and Lötters et al. (2006). The herpetogeographical relationships to other fragments of the equatorial rain forest and other tropical forests have recently been discussed by Wagner et al. (subm.). Despite belonging to Guinea-Congolian forest, Kakamega Forest contains also numerous Afromontane elements (Mutangah et al. 1992; Bennun & Njoroge 1999) in its flora and fauna. Therefore, the forest has a very large diversity and zoogeographical value which has been shown by several authors for the different species groups (e. g. Odonata: Clausnitzer 1999 & 2005; Amphibia: Schick et al. 2005; Reptilia: this paper; Aves: Zimmermann 1972) and a lot of species are not found elsewhere in Kenya. Additionally, most of the remaining closed canopy forest within the country is found in western Kenya (Wass 1995). On a national scale, the forest can be considered as a diversity hotspot and needs efficient protection. On the pan-African

Fig. 1. The main areas of investigation of BIOTA East Africa in the Kakamega Forest in the background a subset of a Landsat 7 (ETM+) scene from 5 Feb 2001, contrast-enhanced band combination 5/4/3 for within-forest differentiation but printed in black and white. (Courtesy to G. SCHAAB of BIOTA – E02).

scale, Kakamega forest is not considered as a hot-spot because in comparison with e. g. the Mt. Nlonako in Cameroon (99 amphibian [HERRMANN et al. 2005a] and 89 reptile species, [HERRMANN et al. 2005b]) the diversity is comparatively low.

Compared with other vertebrate groups, East African amphibians and reptiles are rather poorly studied and insufficiently known. In order to provide conservationists data for defining priorities for conservation it is necessary to obtain basic information on the diversity and community of forest amphibians and reptiles.

Amphibians have been intensively studied by several authors within the 'Biota East Africa Project' (e. g. SCHICK et al. 2005; LÖTTERS et al. 2004; LÖTTERS et al. 2006; KÖHLER et al. 2006) whereas reptiles have been surveyed only superficially in the Kaimosi fragment by LOVERIDGE (1935, 1936) and in the main forest by DREWES (1976). Subsequently no further reports on Kakamega reptiles have been published apart from the mentioning of single voucher specimens as e. g. in SPAWLS et al. (2002) and publications arising from this study (BÖHME et al. 2005; KÖHLER et al. 2004; WAGNER & SCHMITZ 2006; WAGNER et al. subm.).

The aim of the present paper is to provide an overview of the herpetofauna of this forest as basic information for conservationists and wildlife biologists and to highlight the importance of the Kakamega Forest because of its impact and value on the biodiversity of Kenya.

2. DESCRIPTION OF THE STUDY AREA

Kakamega Forest is situated in the Kakamega District near Kakamega town in the Western Province of Kenya. The forest extends from 0°10' and 0°21 N to 34°47' and 34°58'E, covering an area of 240 km^2, of which only 44.55 km^2 are protected by law (MITCHELL 2004).

The forest altitude varies between 1500 and 1700 m a.s.l. (above sea level) averaging 1650 m a.s.l. The forest becomes part of the stratified landscape of the East African Rift Valley, situated 150 km to the east. The annual precipitation ranges from 1500 to 2300 mm. The annual average temperature is 27 °C at daytime and 15 °C at night. Two important rivers traverse the forest: the Isiukhu River in the north and the Yala River in the south. Both have their source in the Nandi Escarpment and drain into the nearby Lake Victoria. The forest block itself is surrounded by several forest fragments (e. g. Kisere, Malaba, Kaimosi), which differ in size, in the degree of destruction and their conservation status. The most important of these are the Kisere in the north and the Kaimosi fragment in the south. Kisere is protected as a National Reserve whereas Kaimosi is unprotected but well known historically from several collections made by A. LOVERIDGE and from the three herpetological taxa described by him from Kaimosi and named after this forest: *Agama kaimosae, Typhlops kaimosae* and *Dendroaspis jamesoni kaimosae.*

The eastern border of the forest is the 2200 m high Nandi Escarpment with its Northern Nandi and Southern Nandi forest. Both are considered to be montane forests because of the occurrence of the tree fern *Cyathea manniana* as an indicator species of this forest type. The forests were contiguous with the Kakamega forest system until recently. MITCHELL (2004) pointed out that the North Nandi forest was not connected with Kakamega forest in the 20th century although there was "dense forest" in the 1960's between South Nandi forest and Kakamega Forest.

Collection sites mentioned in this paper are as follows: the 'Buyangu area' is the name of the northern part of the Kakamega National Reserve ('primary-like' forest), with the Buyangu Village on his northern margin. Salazar Circuit is an old plantation within the National Reserve, which is now secondary forest dominated by guava. Udo's Campsite is located within the northern part of the National Reserve and is the home of the BIOTA field camp. Isecheno is the low protected southern part of the forest. Rondo Retreat Centre is a small hotel within this area.

3. MATERIAL AND METHODS

The material presented in this paper was partly collected during a three-month herpetological mission by the senior author, which was carried out between March and June 2003. It was completed by some older voucher material from Kakamega Forest in the ZFMK collection, collected by H.W. HERRMANN, D. MODRY and P. NECAS. Material from Kakamega Forest is also part of the collections of CAS, MHNG, NHMW, NMK, USNM, but this material was only partly analysed by the authors. Relevant literature data was also evaluated. During the 2003 mission 170 reptiles were collected. Amphibians were not the main emphasis of the study but also collected and compared with the species list presented by SCHICK et al. (2005). Specimens of the study were fixed in 98 % ethanol and subsequently transferred to 70 % ethanol. For final deposition, they were equally partitioned between the NMK and ZFMK collections. The main forest and the forest fragments were walked during both day and night and specimens, mostly arboreal, were caught dominantly by visual encounter surveys along transects and opportunistic searches. In addition, Y-shaped drift-fences with pitfalls were used for terrestrial species. Catching success was low; only *Adolfus africanus* (Lacertidae) and amphibians were caught using this method. The roads were patrolled for snakes and the human inhabitants of the surrounding villages were recruited to help with collecting.

The individual species accounts include the following parts: *Specimens examined*: gives a list of the material from museums collections examined by the authors; *Additional specimens*: refer to material known from other collections and not examined by the authors; *Key references*: lists publications with more detailed information on species of Kakamega forest; *Remarks*: gives information about the collected specimens and taxonomic statements.

We follow mostly the classification and taxonomic conclusions of FROST et al. (2006), however there are several taxonomic conclusions in their amphibian tree of live tat we can not fathom and in our opinion require additional evidence and study.

Collection codens: BIOTA= Biomonitoring Transect Analysis in Africa; BMNH = The Natural History Museum (British Museum [Natural History]), London, England; CAS= California Academy of Science, San Francisco, USA; MCZ= Museum of comparative Zoology, Harvard University, Cambridge/Massachusetts, USA; MHNG= Muséum d'histoire naturelle, Geneva, Switzerland; NHMW= Naturhistorisches Museum Wien, Vienna, Austria; NMK= National Museums of Kenya, Nairobi, Kenya; PW= field number of the senior author; USNM= National Museum of Natural History, Smithsonian Institution, Washington D.C., USA; ZFMK= Zoologisches Forschungsmuseum Alexander Koenig, Bonn, Germany.

4. RESULTS

4.1. Checklist of the herpetofauna of Kakamega Forest

Amphibia

Pipidae Gray, 1825

Xenopus victorianus Ahl, 1924

1924 *Xenopus victorianus* Ahl, Mitt. Zool. Mus. Berlin, 11: 270.

Specimens examined. ZFMK 81733-735, 81940.

Additional specimens. NMK A/3874/1, A/3935, A/3944, A/4025/1-2, A/4062/1-8, A/4163.

Key references: SCHICK et al. 2005.

Remarks: This species was often found in drift fence buckets in the Buyangu area near a small pond within the forest (ZFMK 81940). It was also found at Rondo Retreat in the southern part of the forest (ZFMK 81735). The vouchers are assigned to *Xenopus victorianus* in SCHICK et al. (2005) and to *Xenopus* sp. in LÖTTERS et al. (2006).

Bufonidae Gray, 1825

Amietophrynus kisoloensis (Loveridge, 1932)

1932 *Bufo regularis kisoloensis* Loveridge, Occas. Pap. Boston Soc. Nat. Hist., 8: 52.

Specimens examined. ZFMK 81727-730, 81943.

Additional specimens. NMK A/104-106, A/108, A/1072/1-2, A/1293/1-2, A/1318/1-2, A/1648/1-3, A/2046/1-4, A/3055/1-3, A/3104/1-3, A/3153/1-9, A/3563/1-2, A/3750/1-3, A/3813, A/3850/2, A/3851/1-3, A/3943.

Remarks: ZFMK 81727-728 were collected in the Buyangu area. ZFMK 81943 was found in the Malaba fragment of the forest. ZFMK 81729 and A/3055/1-3 are from Rondo Retreat Centre, NMK A/3104/1-3 from Isecheno forest camp both located in the southern part of

the forest. NMK A/3850/2 was collected at the Isiukhu falls in the Buyangu area.

Amietophrynus maculatus (Hallowell, 1854)

1854 *Bufo maculatus* Hallowell, Proc. Acad. Nat. Sci. Philadelphia, 7: 101.

Specimens examined. ZFMK 77458, 81723-726, 81941-942.

Additional specimens. NMK A/1194, A/3850/1,3-10.

Remarks: ZFMK 81941-942 were collected within Buyangu Village along a road under stones next to a stream. NMK A/3850/5 was collected at the Isiukhu falls in the Buyangu area. NMK A/1194 was from the Malava forest fragment.

Ranidae Rafinesque, 1814

Hoplobatrachus occipitalis (Günther, 1859)

1859 *Rana occipitalis* Günther, Arch. Naturgesch., 24: 320.

Specimens examined. NMK A/3938.

Key referenees: SCHICK et al. 2005.

Remarks: The voucher was collected in a swamp in the Buyangu area. Specimens, both adults and tadpoles, were found in an old swimming pool of the Serena Island Lodge in Kakamega town and were documented by a voucher specimen (NMK uncatalogued) and photographs.

Fig. 2. *Hoplobatrachus occipitalis* from Kakamega town. Photo by Jörn KÖHLER.

Phrynobatrachus graueri (Nieden, 1911)

1911 *Arthroleptis graueri* Nieden, Sitzungsber. Ges. Naturforsch. Freunde Berlin, 1910: 441.

Specimens examined. None.

Additional specimens. NMK A/198, A/3105/2.

Key referenees: LÖTTERS et al. 2006.

Remarks: The specimen NMK A/198 was collected on a bridge near Kakamega town. NMK A/3105/2 was collected at the Kalunga glade at the Kakamega Forest.

Phrynobatrachus aff. *mababiensis* FitzSimons, 1932

1932 *Phrynobatrachus mababiensis* FitzSimons, Ann. Transvaal Mus., 15: 40.

Specimens examined. None.

Remarks: This species has only been recorded from literature (SCHICK et al. 2005) and is currently under investigation by SCHICK et al. (2005) and other colleagues.

Phrynobatrachus natalensis (Smith, 1849)

1849 *Stenorhynchus natalensis* Smith, Ill. Zool. S. Afr., 3 (Appendix): 24.

Specimens examined. ZFMK 81742-43.

Additional specimens. NMK A/3105/1, A/3863/1-4, A/3931, A/3932.

Remarks: NMK A/3105/1 was from the Kalunga glade within the Kakamega forest area. The series NMK A/3863 and the ZFMK vouchers were from the Buyangu area. Details on the other vouchers are unknown.

Phrynobatrachus aff. *minutus* (Boulenger, 1895)

1895 *Arthroleptis minutus* Boulenger, Proc. Zool. Soc. London, 1895: 539.

Specimens examined. None

Additional specimens. NMK A/3924/1-6, A/4310.

Key references: LÖTTERS et al. 2006.

Remarks: Details on the vouchers are unknown. NMK A/3924/1,2,5 are on permanent loan to the ZFMK. This taxon was not recorded by SCHICK et al. (2005).

Afrana angolensis (Boeage, 1866)

1866 *Rana angolensis* Bocage, J. Sci. Math. Phys. Nat., Lisboa, I: 73.

Specimens examined. NMK A/100/1-8, A/101, A/102/1-2.

Additional specimens. NMK A/1294/1, A/1314/1-8, A/1649/1-3, A/3639, A/3937/1-2, A/4239.

Key referenees: LÖTTERS et al. 2006.

Remarks: NMK A/4239 was found along the Salazar

road. The series NMK A/1314/1-8 and A/1649 were collected at the Ikuywa River. Details on the other specimens are unknown.

Amnirana cf. *albolabris* (Hallowell, 1856)

1856 *Hyla albolabris* Hallowell, Proc. Acad. Nat. Sci. Philadelphia, 8: 153.

Specimens examined. None.

Additional specimens. NMK A/196/1-2, A/1966.

Key references: Schick et al. 2005; Lötters et al. 2006.

Remarks: The specimens NMK A/196/1-2 came from Kakamega town, near the Forest Department Pump House.

Ptychadena anchietae (Bocage, 1867)

1867 *Rana anchietae* Bocage, Proc. Zool. Soc. London, 1867: 843.

Specimens examined. NMK A/3845.

Additional specimens. A/4212, A/4216, A/4220/1-2, A/4224, A/4226/1-2, A/4234/1-3.

Remarks: NMK A/4212 was collected in a small puddle near the Buyangu view point; NMK A/4220/1-2 were collected in amplexus on the 28.IV.2004 from the same puddle. NMK A/4216 was found in short grass habitat next to a small puddle within the Salazar secondary forest. NMK A/4224 was collected on new Buyangu Campsite. NMK A/4234/1 was collected near the Keep office, A/4234/2-3 near the Isecheno Primary school. Details on the other specimens are unknown.

Ptychadena porosissima (Steindachner, 1867)

1867 *Rana porosissima* Steindachner, Reise Österreichischen Fregatte Novara, Zool.: 18.

Specimens examined. None.

Additional specimens. NMK A/3107/1-3, A/3574, A/4222.

Key references: Schick et al. 2005; Lötters et al. 2006.

Remarks: NMK A/3107/1-3 were collected at Kalunga glade. NMK A/4222 was found calling on wet mud near a water edge in the Buyangu area. Details of the other specimen are unknown.

Ptychadena taenioscelis Laurent, 1954

1954 *Ptychadena taenioscelis* Laurent, Ann. Mus. R. Congo Belge, Tervuren, Zool., 34: 25.

Specimens examined. None.

Additional specimens. NMK A/3955/1-2, A/4213.

Key references: Lötters et al. 2006.

Remarks: NMK A/4213 was found in a small swamp at the Buyangu area. Details on the other voucher are unknown. This species was recorded for the first time for Kenya by Lötters et al. (2006) and at present is only known to occur in Kakamega Forest within Kenya.

Ptychadena aff. *mascareniensis* (Duméril & Bibron, 1841)

1841 *Rana mascariensis* Duméril & Bibron, Erp. Gen., 8: 350.

Specimens examined. ZFMK 81944.

Additional specimens. NMK A/3572, A/3840/4-5, A/3856, A/4214, A/4217/1-2, A/4221, A/4223, A/4227/1-10, A/4229/1-2, A/4232/1-4, A/4235/1-9.

Key references: Vences et al. 2004; Lötters et al. 2006.

Remarks: *P. mascareniensis* was often found on the shore of the Isiukhu River in its small discharging streams and in the Buyangu area. NMK A/4227/1-3 was found near the Keep Office at Isecheno, NMK A/4227/4-10 in a temporary swamp at Isecheno. This taxon was listed by Lötters et al. (2006) as *Ptychadena* aff. *mascareniensis*.

Ptychadena oxyrhynchus (Smith, 1849)

1849 *Rana oxyrhynchus* Smith, Ill. Zool. S. Afr., 3(Part 28): pl. 77, fig 2.

Specimens examined. None.

Additional specimens. NMK A/103/1-2, A/3846, A/4211, A/4215/1-4, A/4218, A/4219/1-3, A/4225/1-2, A/4228/1-3, A/4230/1-2, A/4231/1-2, A/4233/1-4, A/4236/1-2.

Key references: Lötters et al. 2006.

Remarks: NMK A/4225/1-2, A/4228/1-3 and A/4236/1-2 were collected in a pond on the new Buyangu Campsite, NMK A/4231/1-2 was found there in amplexus on the 31. V. 2004 and the female laid eggs over night. NMK A/4233/1-4 were found at Isecheno in the southern part of the forest. Details on the other specimens are unknown. This taxon was listed by Lötters et al. (2006) as *Ptychadena* aff. *oxyrhynchus*.

Hyperoliidae Laurent, 1943

Afrixalus osorioi (Ferreira, 1906)

1906 *Rappia osorioi* Ferreira, J. Sci. Math. Phys. Nat., Lisboa, Ser. 2, 7: 162.

Specimens examined. NMK A/3927/2.

Fig. 3. *Afrixalus osorioi* from Kakamega Forest. Photo by Jörn KÖHLER.

Additional specimens. A/3928, A/4017, A/4316/1-7.

Key references: KÖHLER et al. 2005.

Remarks: NMK A/3927/2 is on permanent loan to the ZFMK. NMK A/4017 and the series A/4316 were collected at a pond within the Buyangu area. One specimen was additionally sighted in the South Nandi forest. This species was recorded for the first time for Kenya by KÖHLER et al. (2005) and at present only occurs in the Kakamega Forest complex within Kenya.

Afrixalus quadrivittatus (Werger, 1908)

1908 '1907' *Megalixalus leptosomus leptosomus* Werger, Sitzungsber. Akad. Wiss. Wien, Phys. Math. Naturwiss. Kl., 116: 1900.

Specimens examined. NMK A/3933/2.

Additional specimens. NMK A/3933/1, A/4317/1-7.

Key references: KÖHLER et al. 2005.

Remarks: NMK A/3933/2 is on permanent loan to the ZFMK and was collected at a swamp in the Buyangu area. The series NMK A/4317 was collected at the pond of the Buyangu area.

Hyperolius acuticeps Ahl, 1931

1931 *Hyperolius acuticeps* Ahl, Das Tierreich, 55: 282.

Specimens examined. ZFMK 77616, 81749-750.

Additional specimens. NMK A/3922/2.

Key references: LÖTTERS et al. 2006.

Remarks: ZFMK 81749-750 were from the Buyangu area. Details on the other vouchers are unknown.

Hyperolius kivuensis Ahl, 1931

1931 *Hyperolius kivuensis* Ahl, Das Tierreich, 55: 280.

Specimens examined. ZFMK 81745-746, 82183-184.

Additional specimens. NMK A/3032/1-16, A/3103, A/3579, A/3709, A/3710, A/3748/1-4, A/3825/1-6, A/3864/4, A/3867/1-5, A/3953, A/4011/1-2, A/4026/1-2, A/4065.

Key references: SCHICK et al. 2005; LÖTTERS et al. 2006.

Remarks: NMK A/3103, A/3867, A/4011, A/4026 and ZFMK 81745-746 were from the Buyangu area. NMK A/4065 was collected at the BIOTA Campsite. Details on the other vouchers are unknown.

Fig. 4. *Hyperolius lateralis* from Kakamega Forest. Photo by Jörn KÖHLER.

Hyperolius lateralis Laurent, 1940

1940 *Hyperolius lateralis* Laurent, Rev. Zool. Bot. Afr., 34: 1.

Specimens examined. ZFMK 81747-748.

Additional specimens. NMK A/2075/5-6, A/2075/8-10, A/3925/1-4, A/3936.

Remarks: NMK A/3925/1 is on permanent loan to ZFMK. ZFMK 81747-748 were from the Buyangu area. NMK A/3936 was from Rondo Retreat Centre in the southern part of the forest. Details on the remaining vouchers are unknown. Within Kenya, this taxon is currently only recorded from the Kakamega Forest.

Hyperolius viridiflavus (Duméril & Bibron, 1841)

1841 *Eucnemis viridi-flavus* Duméril & Bibron, Erp. Gen., 8: 528.

Specimens examined. ZFMK 77426, 81950.

Additional specimens. NMK A/3056/1-3, A/3578, A/3866/5-11, A/668/1-4, A/1193/1-2, A/1444/1-5, A/3749, A/3809/1-5, A/3954/1-2, A/4013, A/4027/1-3, A/4066.

Remarks: Details on the vouchers are unknown, but most are from the Buyangu area. *H. viridiflavus* is the most common frog inside the forest. Specimens were observed at different ponds and also clearings for example, the BIOTA field camp, where several specimens were sitting inside the lavatory. NMK A/1193/1-2 were from Malava forest.

Fig. 5. *Hyperolius cinnamomeoventris* from Kakamega Forest. Photo by Jörn KÖHLER.

Hyperolius cinnamomeoventris Bocage, 1866

1866 *Hyperolius cinnamomeo-ventris* Bocage, J. Sci. Math. Phys. Nat., Lisboa, 1: 75.

Specimens examined. ZFMK 77431-432, 81744.

Additional specimens. NMK A/2095/1, A/3858/1-2, A/3918/1-2, A/4012.

Key references: SCHICK et al. 2005; LÖTTERS et al. 2006.

Remarks: NMK A/3858, A/4012 and ZFMK 81744 are from the Buyangu area. This taxon was reported by LÖTTERS et al. (2006) as *Hyperolius* aff. *cinnamomeoventris*.

Fig. 6. *Kassina senegalensis* from Kakamega Forest. Photo by Jörn KÖHLER.

Kassina senegalensis (Duméril & Bibron, 1841)

1841 *Cystignathus senegalensis* Duméril & Bibron Erp. Gen., 8: 418.

Specimens examined. ZFMK 81741, 81946-949.

Additional specimens. NMK A/1158, A/1317, A/3711, A/3920.

Remarks: All vouchers were from the Buyangu area and some were collected with a drift fence next to a pond. One specimen was collected on the Buyangu Hill outside the forest under stones.

Fig. 7. *Leptopelis mackayi* from Kakamega Forest. Photo by Arne SCHIOTZ.

Arthroleptidae Mivart, 1869

Leptopelis mackayi Köhler, Bwong, Schick, Veith & Lötters, 2006

2006 *Leptopelis mackayi* Köhler, Bwong, Schick, Veith & Lötters, Herpetological Journal 16: 183-189.

Specimens examined. ZFMK 83304-305 (paratypes), ZFMK 83306.

Additional specimens. NMK A/3057/1 (holotype), NMK A/1407/1-3 (paratypes), NMK A/3072/1.

Key references: KÖHLER et al. 2006.

Remarks: This species was reeently described by KÖHLER et al. (2006) and is only known from Kakamega Forest and its vicinity and inhabits so far only forest habitats (also seeondary and disturbed forest). It represents the sister taxon of the West African *L. modestus* and was referred to this speeies in the past by SCHIOTZ (1975, 1999).

Leptopelis aff. *bocagii* (Günther, 1865)

1865 "1864" *Cystignathus bocagii* Günther, Proc. Zool. Soc. London, 1864: 481.

Specimens examined. None.

Additional specimens. UZM R/074960-2.

Fig. 8. *Leptopelis* aff. *bocagii* undescribed form from Kakamega Forest. Photo by Arne SCHIOTZ.

Key references: SCHIOTZ 1975.

Remarks: SCHIOTZ (1975) collected two males and one female (UZM R/074960-2). These vouchers were taken from a savannah-like clearing near the Forest Station in Kakamega Forest. One male was sitting in the bush when calling. See SCHIOTZ (1975) for more details on the call. *L.* aff. *bocagii* is an undescribed species, very close in morphology to *L. bocagii*. Only a few specimens are known, all from Kakamega (A. SCHIOTZ, pers. comm.).

Reptilia

Agamidae Spix, 1825

***Acanthocercus atricollis* (Smith, 1849)**

1849 *Agama atricollis* Smith, Illustrations of the Zoology of South Africa. 3 (Reptiles).

Specimens examined. NMK L/2655, 2660/2-3; ZFMK 81952-963.

Additional specimens. CAS 122731-122739.

Key references: KLAUSEWITZ 1957.

Fig. 9. *Acanthocercus atricollis* from Kakamega Forest. Photo by Philipp WAGNER.

Remarks: The debate of the taxonomic status of this species is still ongoing. Many authors (e. g. BOULENGER 1896, KLAUSEWITZ 1957, LOVERIDGE 1957) have discussed differences or similarities between this taxon and *Acanthocercus cyanogaster* RÜPPELL 1835. SPAWLS et al. (2002), LARGEN & SPAWLS (2006) and our own morphology studies of the two species support KLAUSEWITZ (1957) who regarded them as two distinct species. The reported distribution of both taxa is unclear because of the mentioned taxonomic problems.

Despite the works of KLAUSEWITZ (1954, 1957), a new review of the *Acanthocercus*- species complex is needed. The review will be a part of the PhD thesis of the senior author.

The diagnoses of the subspecies of *A. atricollis* by KLAUSEWITZ (1957) are not adequate. Therefore, the material is only preliminarily assigned to the subspecies *ugandaensis* because Kakamega Forest is geographically closer to the area of this subspecies than to *minuta*, according to KLAUSEWITZ's (1957) map: *A. a. minuta* inhabits Ethiopia and eastern Kenya, while *A. atricollis ugandaensis* occurs within Uganda and western Kenya.

Fig. 10. *Agama kaimosae* from Ngoromosi/ Nandi escarpment. Photo by Alexander BURMANN.

This agama subspecies was found in all areas surrounding Kakamega Forest. It reaches the highest density in small villages and Ranger Stations and lives there on the clay huts, in syntopy with *Trachylepis striata* and *Adolfus jacksoni*. It also occurs in hedges close to trees. It was not found inside the forest and also not in plantations and on forest edges.

Agama kaimosae Loveridge, 1935

1935 *Agama agama kaimosae* Loveridge, Bull. Mus. Comp. zool., Harvard 79:10.

Specimens examined. ZFMK 83658-660; NMK L/2715/1,3,4; MCZ 40136- 40150.

Key references: Burmann 2006, Wagner et al. 2007.

Remarks: After its synonymisation by Loveridge (1936), this taxon was regarded as a synonym of *Agama caudospinosa*. But further investigations (Burmann 2006, Wagner et al. 2007) have shown that *Agama kaimosae* is a valid species. The taxon is a SW Kenyan/N Tanzanian endemic (see map in Wagner et al. 2007). The type locality is a rocky highland three miles west of the Friends' Africa Mission Station at Kaimosi. However no specimens were found there, neither by the senior author in 2003 nor by A. Burmann in 2005. Our specimens were collected in Ngoromosi in the Nandi escarpment.

Chamaeleonidae Gray, 1825

Chamaeleo gracilis Hallowell, 1842

1842 *Chamaeleo gracilis* Hallowell, J. Acad. Nat. Sci. Philadelphia 8: 324.

Specimens examined. NMK L/2203/1, NMK L/2653/1-2; ZFMK 82055-056.

Remarks: The species was not found in Kakamega Forest directly but in forest edge areas of the South Nandi Forest, located slightly east of Kakamega Forest. These forests were united with Kakamega until recently (Mitchell 2004), but in contrast to Kakamega the Nandi Escarpment has montane vegetation. The specimens were found in bushes next to the forest, on the western slopes of the Nandi escarpment.

Chamaeleo hoehnelii Steindachner, 1891

1891 *Chamael(e)o höhnelii* Steindachner, Anz. Akad. Wiss. Wien 28: 141.

Specimens examined. NMK L/252.

Remarks: This voucher was collected in Kakamega town, so it is possible that the species also occurs in the surrounding area of Kakamega Forest.

Fig. 11. *Chamaeleo ellioti* from Kakamega Forest. Photo by Philipp Wagner.

Chamaeleo laevigatus Gray, 1863

1863 *Chamaeleo laevigatus* Gray, Proc. Zool. Soc. London 1863: 95.

Specimens examined. NMK L/1588.

Remarks: The only specimen of this taxon was found 1981 by Madsen six kilometres north of Kakamega town. Further data was not available.

Chamaeleo ellioti Günther, 1895

1895 *Chamaeleo ellioti* Günther, Ann. Mag. Nat. Hist., London 15: 524, pl. 21, fig. A.

Specimens examined. NMK L/2480, L/1227, L/1273, L/2647, L/2653/1-2, L/2652/1-2, L/2658; ZFMK 54025, 68494-97, 70835, 81974-80, 82057-58.

Additional specimens. CAS 147912, 153247.

Remarks: The species has a wide distribution in the Kakamega area and specimens were found in several habitats in and around the forest. In the year of the fieldwork

Fig. 12. *Rhampholeon boulengeri* from Kakamega Forest. Photo by Philipp WAGNER.

of the senior author, *C. ellioti* was one of the species with the highest observed density. Only two years later it was very difficult to find them (P. HITA-GARCIA pers. comm.). This was also corroborated by SPAWLS et al. (2002) and SCHMIDT et al. (2000) who also indicate that *C. ellioti* has large population density dynamics. This chameleon was found in the surrounding areas of Kakamega and Nandi forests, and also inside the forest, on the shore of the Isiukhu River. Habitats were as follows: grassland, banana and guava plantations, gardens, hedges, bushes, small trees, secondary and riverside forest.

Rhampholeon boulengeri Steindachner, 1911

1911 *Rhampholeon boulengeri* Steindachner, Anz. Akad. Wiss., Wien, 48: 178.

Specimens examined. NMK L/249, L/7270, L/2651, ; ZFMK 54021-24, 77456, 81999.

Remarks: *R. boulengeri* is a typical dweller of the East African rain forests from the eastern parts of the DR Congo in the west to Kenya in the east. Here it is, apart from Kakamega and Nandi forests, also found in the Cherangani Mts. (SPAWLS et al. 2002). Within Kakamega Forest the pygmy chameleon was found in the northern part of the main fragment and in the Kisere fragment.

Gekkonidae Oppel, 1811

Cnemaspis africana (Werner, 1895)

1895 *Gymnodactylus africanus* Werner, Verh. zool.-bot. Ges. Wien 45: 190, pl. V, fig. 5.

Specimens examined. NMK L/1987; ZFMK 82022.

Remarks: This taxon is endemic to eastern Africa and is only distributed in Kenya and Tanzania. Next to Kakamega Forest, the lizard is only known from Taita and Shimba Hills and Athiplain. ZFMK 82022 was collected in a pitfall trap near the Buyangu Hill. This suggests that *C. africana* is not a strict tree dweller but also inhabits leaf litter during its search for food.

Fig. 13. *Cnemaspis elgonensis* from Kakamega Forest. Photo by Philipp WAGNER.

Cnemaspis elgonensis Loveridge, 1935

1935 *Cnemaspis elgonensis* Loveridge, Proc. Zool. Soc. London 1935: 820.

Specimens examined. NMK L/1129, L/2263; ZFMK 82023.

Additional specimens. USNM 158923.

Remarks: *C. elgonensis* is endemic to Uganda and Kenya and has a very restricted distribution area from the Mt. Elgon range to Kakamega in the south. Nothing is known about its biology but similarities with other species of the genus can be anticipated. ZFMK 82023 was found at dawn on the lavatory of Udo's Campsite in the northern part of the forest.

Hemidactylus mabouia (Moreau de Jonnes, 1818)

1818 *Gekko mabouia* Moreau de Jonnes, Bull. Scient. Soc. Philomath. Paris, sér 3,5: 138.

Specimens examined. NMK L/2648/1-2, L/2659/1, L/2659/3-4; ZFMK 70833-34, 81982-86.

Remarks: This species inhabits nearly the entire sub-Saharan Africa. It has been transported by humans to South America (DIRKSEN 1995), Florida, USA (POWELL et al. 1998), Madagascar (GLAW & VENCES 1994) and to Madeira, Portugal (JESUS et al. 2002). In Kakamega it inhabits the houses of the villages around the forest and also of Kakamega town. No specimens were found outside of human habitations.

Fig. 14. *Lygodactylus gutturalis* from Kakamega Forest. Photo by Jörn KÖHLER.

Lygodactylus gutturalis (Bocage, 1873)

1873 *Hemidactylus gutturalis* Bocage, J. Sci. math. phys. nat. Lisboa 4: 211.

Specimens examined. NMK L/2464; ZFMK 81987.

Remarks: This is the first record of the species for Kenya. The geographically closest record is from the Ugandan side of Mt. Elgon. *L. gutturalis* is a typical species of the equatorial rain forest and is distributed from Senegal in the west to Kenya in the east. As it is the case in several other forest species with the same distribution pattern (e. g. *Lepidothyris fernandi* species complex: WAGNER et al. subm.), the East African populations might prove to be a new taxon. NMK L/2464 was found inside a tent on Udo's Campside.

Scincidae Oppel, 1811

Eumecia anchietae Bocage, 1870

1870 *Eumecia anchitae* Bocage, J. Sci. Lisboa 3: 66-68.

Specimens examined. NMK L/110/1+2, L/2657, L/2669; ZFMK 75069, 76044, 81981.

Remarks: This species was found in several habitats, e. g. urban areas inside the villages and Guava dominated secondary structures. ZFMK 81981 was found on a tree (Strychnaceae: *Strychnos* cf. *usambarensis*), which was very slanting and shaggy with ferns and mosses, so this sighting was presumable an exception of this normally ground-dwelling species.

Feylinia currori Gray, 1845

1845 *Feylinia currori* Gray, Catalogue of the lizards of the British Museum, p. 129.

Specimens examined. NMK L/2662; ZFMK 81998.

Key references: WAGNER & SCHMITZ 2006.

Remarks: These specimens were the first records of this species and genus in Kenya (WAGNER & SCHMITZ 2006). They were found crossing a road (ZFMK 81998) and in leaf litter (NMK L/2662). A morphological comparison between east and west African populations results in no geographic directed differences (WAGNER & SCHMITZ 2006).

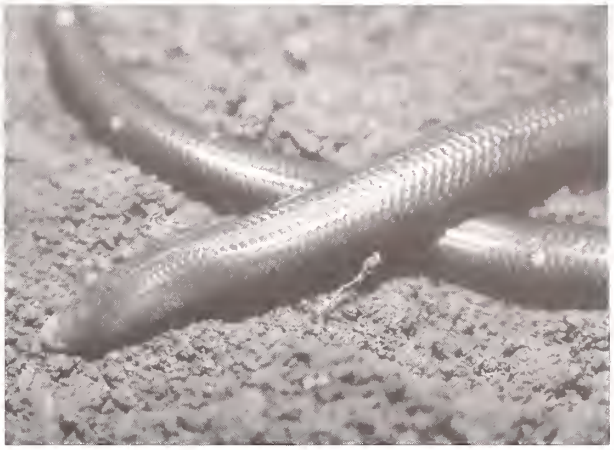

Fig. 15. *Feylinia currori* from Kakamega Forest. Photo by Philipp WAGNER.

Lepidothyris aff. *fernandi* (Burton, 1836)

1836 *Tiliquia fernandi* Burton, Proc. Zool. Soc. London 1836: 62.

Specimens examined. NMK L/2147.

Key references: WAGNER et al. (subm.).

Remarks: This secretive skink is probably the rarest reptile of the forest. It is only recorded by one voucher specimen and from one sighting (S. SCHICK, pers. comm.) in 2002. This typical equatorial rain forest species complex is distributed from Sierra Leone in the west to Kenya in the east and is currently portioned into several taxa (WAGNER et al. subm.). The East African populations inhabit the forests of the eastern DR Congo to Kenya, southwards to Zambia and south-westwards to Congo and Angola. The single specimen was found in a pitfall trap next to Buyangu Hill. Also the visual record was on a forest path within this area.

Afroablepharus wahlbergi (Smith, 1849)

1849 *Cryptoblepharus wahlbergi* Smith, Illus. zool. S. Africa, 3, App. p.10.

Specimens examined. None.

Additional specimens. MCZ 41601-10, 41614-7.

Key references: LOVERIDGE 1936.

Remarks: The vouchers were collected by LOVERIDGE (1936) at Kaimosi area and he remarked that most of the collected female specimens were pregnant in February.

***Trachylepis maculilabris* (Gray, 1845)**

1845 *Euprepis maculilabris* Gray, Catalogue of the lizards of the British Museum.

Specimens examined. None.

Additional specimens. CAS 122720, 122723; USNM 49203.

Key references: DREWES 1976.

Remarks: The material from CAS was collected by DREWES (1976) in Kaimosi area. Since then no other vouchers were collected.

***Trachylepis megalura* (Peters, 1878)**

1878 *Euprepis megalurus* Peters, Monatsber. Akad. Wiss. Berlin, p. 204.

Specimens examined. NMK L/1915/1-2; ZFMK 81997.

Additional specimens. CAS 122728; USNM 49066-68, 49199.

Remarks: Only a single specimen was found during the survey 2003 on a slope of the Liranda Hill in the southern part of the forest. This habitat is dominated by grassland with sporadic trees. The only other reptile species recorded on this hill in rocky areas was *T. quinquetaeniata*. DREWES (1976) found the taxon also on clearings in the Buyangu area.

***Trachylepis quinquetaeniata* (Lichtenstein, 1823)**

1823 *Scincus quinquetaeniatus* Lichtenstein, Verzeichnis der Dubletten, Berlin, p. 103.

Specimens examined. NMK L/2650/2-3, 2650/5, 2656/2-3; ZFMK 81988-93, 81995-96, 82060-61.

Additional specimens. CAS 122709-719, 122721-722.

Remarks: The species shows a disjunct distribution within the Kakamega area. It is only found in rocky areas of the Buyangu and Liranda Hill as well as on a small hill near Kisere. No specimens were found on houses, bridges or other human buildings as it was described by SPAWLS et al. (2002). Also DREWES (1976) found the specimens on exposed rocks. FINK (2003) has shown that the diet is dominated by isopod species, but also molluscs were found.

***Trachylepis striata* (Peters, 1844)**

1844 *Tropidolepisma striatum* Peters, Berl. Bekanntmach. Geeignet. Verhandl. Königl.-Preuss. Akad. Wiss. Berlin 1844: 32-37.

Specimens examined. NMK L/2654/2, 2654/5; ZFMK 70825-30, 82002-06, 82011-21.

Additional specimens. CAS 122724-727; USNM 49069-71, 49207-16, 49389, 49393.

Remarks: *T. striata* is one of the species with the highest density in Kakamega area and was found everywhere outside the forest or wooded areas. But meanwhile the species has reached the BIOTA Camp, located on a small clearing of Udo's Campside inside the forest. Here and on the houses of the near villages it is sympatric with *Adolfus jacksoni* (Lacertidae) and only on the houses also with *Acanthocercus atricollis* (Agamidae). In contrast to the data given by RAZZETTI & MSUYA (2002) and SPAWLS et al. (2002), *T. striata* was never found on trees or in plantations. The diet analysed by FINK (2003) is dominated by Coleoptera and also consists of other winged insects, collembolans, spiders, nematodes and molluscs.

Fig. 16. *Adolfus africanus* from Kakamega Forest. Photo by Philipp WAGNER.

Lacertidae Oppel, 1811

***Adolfus africanus* (Boulenger, 1906)**

1906 *Algiroides africanus* Boulenger, Proc. Zool. Soc. London 2: 570-572.

Specimens examined. NMK L/2661/2; ZFMK 77457, 81205-07.

Key references: KÖHLER et al. 2004.

Remarks: These specimens were the first record of the species for Kenya (KÖHLER et al. 2004). As a typical inhabitant of the equatorial rainforest, *A. africanus* has a disjunct distribution from Cameroon in the West to Kenya in the East, but taxonomic comparisons have shown that there are no geographic directed differences between the populations (KÖHLER et al. 2004) and no subspecies are recognizable. Most of the vouchers were collected in a pitfall trap near the Buyangu Hill. ZFMK 81207 was collected by hand in a secondary guava forest, the Salazar Circuit. ZFMK 77457 was collected in the southern part of the forest near Isecheno by W. FREUND and J. KÖHLER in 2002.

Fig. 17. *Adolfus jacksoni* from Kakamega Forest. Photo by Jörn Köhler.

Adolfus jacksoni (Boulenger, 1899)

1899 *Lacerta jacksoni* Boulenger, Proc. Zool. Soc. London 1: 96-98.

Specimens examined. PW 04 & PW 05 (now part of the NMK collection); ZFMK 70831-32, 81964-73.

Additional specimens. CAS 122729-30, 141566, 147904.

Key references: Spawls & Rotich 1997.

Remarks: *A. jacksoni* was recorded for Kakamega Forest by Spawls & Rotich (1997) for the first time. Most of the specimens were collected in the Biota Camp and in forest surrounding villages. No specimens were found in gardens or small plantations but they were sighted on trees within maize and cane fields. Only one specimen was sighted near to the forest inside the Salazar Circuit. In contrast to the data provided by Razzetti & Msuya (2002), *A. jacksoni* was rarely seen climbing on trees. The diet consists mainly of Isoptera, Orthoptera and Lepidoptera, but also of other arthropods.

Cordylidae Mertens, 1937

Chamaesaura anguina (Linnaeus, 1758)

1758 *Chamaesaura tenuior* Linnaeus, Systema Naturae. 10th edition.

Specimens examined. NMK L/2020.

Remarks: The specimen was collected in 1992 probably in the southern part of the forest. Further data are not available. Because of the distribution this specimen was assigned by use to the subspecies *tenuior*.

Varanidae Hardwicke & Gray, 1827

Varanus aff. *niloticus* (Linnaeus, 1766)

1766 *Lacerta nilotica* Linnaeus, Syst. Nat. Ed. 12 (1): 369.

Specimens examined. None.

Remarks: This species is known only from literature and sightings (Loveridge 1936; Mertens 1942). The details of the specimens seen are unknown. Specimens were sighted (by the first author and by J. Köhler, pers. comm.) on the shore of the Isiukhu River near Buyangu village. It remains to be shown whether the Kakamega population belongs to *V. niloticus* or *V. ornatus*. The fact that Kakamega Forest is a remnant of the equatorial rain forest makes the existence of *V. ornatus* possible. The nearest locality documented by a voucher specimen is Kisumu (NMK L/2476), but this is a typical habitat for *V. niloticus*. Also Analo (2003) refers to the occurrence of *Varanus niloticus* in the Kakamega area and reported that the skin is used for traditional drums.

Typhlopidae Merrem, 1820

Typhlops angolensis (Bocage, 1866)

1866 *Onychocephalus angolensis* Bocage, Jorn. Sci. Math. Phys. Nat. Lisboa 1: 46, 65.

Specimens examined. None.

Remarks: This taxon is known only from literature (Loveridge 1935) and further data were not available.

Fig. 18. *Typhlops lineolatus* from Kakamega Forest. Photo by Mike Dobiey.

Typhlops lineolatus Jan, 1864

1864 *Typhlops lineolatus* Jan, Iconogr. Gén. Ophid. 1(9. livr.): 5.

Specimens examined. PW 157 & 162 (now part of the NMK collection); ZFMK 73283, 82051-52.

Remarks: Most of the vouchers were collected after rainfall on Udo's Campsite. One specimen (ZFMK 82051) was from Buyangu village and collected in a grassy area on a rainy day.

Colubridae Oppel, 1811

***Crotaphopeltis hotamboeia* (Laurenti, 1768)**

1768 *Coronella hotamboeia* LAURENTI, Syn. Rept.: 58.

Specimens examined. NMK O/2691

Remarks: Further data on the NMK specimen is not available, but one specimen was sighted at Salazar Circuit.

***Dasypeltis atra* Sternfeld, 1912**

1912 *Dasypeltis scabra* var. *atra* Sternfeld, IV. Zool. 11 Lfg. Reptilia, in: Schubotz: Wiss. Ergeb. Deut. Zentr. Afr. Exp.: 197-279.

Specimens examined. MHNG 1.262.072-075; NMK S/2576; ZFMK 77459, 82054.

Additional specimens. CAS 142248.

Remarks: SPAWLS et al. (2002) noted that completely black specimens have been collected east of the Rift Valley. So, ZFMK 82054 is probably the first melanistic voucher from west of the Rift Valley. However, ZFMK 77459 demonstrates sympatric occurrence of the light colour phase with the melanistic one.

***Dasypeltis scabra* (Linnaeus, 1758)**

1758 *Coluber scaber* Linnaeus, Syst. Nat. Ed. 10(1): 824.

Specimens examined. ZFMK 75070.

Additional specimens. USNM 49376.

Remarks: Further data are not available, but specimens were sighted at Salazar Circuit.

***Dispholidus typus* Smith, 1829**

1829 *Bucephalus typus* Smith, Zool. Journ. 4: 433-444.

Specimens examined. NMK S/986

Remarks: This specimen is assigned to the subspecies *kivuensis*, because of its distribution from west of the Rift Valley in Kenya to Rwanda in the east and Zambia in the south. Further data are not available, but one specimen was sighted by the senior author in secondary forest at the Salazar Circuit.

***Hapsidophrys lineatus* Fischer, 1856**

1856 *Hapsidophrys lineatus* Fischer, Abhandl. Nat. Ver. Hamburg 3 (4): 81-116.

Specimens examined. NMK O/2715; ZFMK 82053.

Fig. 19. *Dispholidus typus* from Kakamega Forest. Photo by Mike DOBIEY.

Additional specimens. CAS 147910-11, 147913, 150987, 153222.

Remarks: This species which is typical for the equatorial rainforest, is distributed from Guinea-Bissau in the west to Kenya in the east and taxonomic analyses did not show geographic directed differences between the populations. ZFMK 82053 was found basking on a bush next to a small pond in the Buyangu area.

***Lamprophis fuliginosus* (Boie, 1827)**

1827 *Lycodon fuliginosus* Boie, Isis van Oken 20, col. 551.

Specimens examined. NMK S/3981/1-2; ZFMK 82037-43.

Additional specimens. CAS 122743, 141529.

Remarks: All vouchers were collected inside the houses or gardens of Buyangu Village.

***Lycophidion capense* (Smith, 1831)**

1831 *Lydodon capensis* Smith, S. Afr. Quart. J., 1: 18.

Specimens examined. None.

Additional specimens. CAS 122741.

Remarks: Further data are not available. The specimen is catalogued at CAS as *L. c. capense* BOULENGER, 1893.

***Lycophidion depressirostre* Laurent, 1968**

1968 *Lycophidion depressirostre* Laurent, Bull. Mus. Comp. Zool., Harv. 136 (12): 472.

Specimens examined. None.

Additional specimens. USNM 49388.

Remarks: Further data are not available.

Lycophidion ornatum Parker, 1936

1936 *Lycophidion ornatum* Parker, Novit. Zool. 40: 122.

Specimens examined. ZFMK 75071, 82044.

Additional specimens. BMNH 1962.819; MCZ 40471-73.

Remarks: *L. ornatum* has a wide distribution from Nigeria in the West to Mt Kenya in the East. ZFMK 82044 was found in twilight inside the forest.

Meltelya capensis (Smith, 1847)

1847 *Heterolepis capensis* Smith, Illustrations of the zoology of South Africa, Reptilia.

Specimens examined. None.

Additional specimens. CAS 150988.

Remarks: This voucher is catalogued at CAS as *M. c. savorgnani* Mocquard, 1887. Further data are not available.

Natriciteres olivacea (Peters, 1854)

1854 *Coronella olivacea* Peters, Monatsber. Königl. Akad. Wiss. Berlin 1854: 614-628.

Specimens examined. ZFMK 82035.

Remarks: *N. olivacea* inhabits water bodies in bushland and savannah regions. In contrast to the described habitats (e. g. Spawls et al. 2002; Marais 2004), our specimen was collected basking on dense vegetation on the shore of the Isiukhu inside the northern part of the forest. But there is another specimen collected inside a forest by Ullenbruch (2003) in Benin.

Philothamnus battersbyi Loveridge, 1951

1951 *Philothamnus irregularis battersbyi* Loveridge, Bull. Mus. Comp. zool. Harvard 106: 51.

Specimens examined. NMK S/3986, S/3992; ZFMK 82048.

Additional specimens. CAS 150978-980, 153223.

Remarks: *Philothamnus* is probably one of the most difficult, for the taxonomists, reptile genera in Africa. But *P. battersbyi* is relatively easy to identify by the uniform green colouration, two supralabials entering the eye, a divided anal scale, 15 midbody scale rows and no keels on the subcaudal scales. It can only be confused with the likewise uniform green *P. angolensis*. Most vouchers collected within the study were found in Buyangu Village basking on small bushes. One was found killed on the road.

Fig. 20. *Philothamnus battersbyi* from Kakamega Forest. Photo by Philipp Wagner.

Philothamnus carinatus (Andersson, 1901)

1901 *Chlorophis carinatus* Andersson, Bihang Till. K. Sv. Vet.- Akad. Handl. 27 (5): 9.

Specimens examined. None.

Remarks: This taxon is only recorded from literature (Hughes 1985; Spawls et al. 2002).

Further data are not available.

Philothamnus heterolepidotus (Günther, 1863)

1863 *Ahaetulla heterolepidota* Günther, Ann. Mag. Nat. Hist. 11 (3): 286.

Specimens examined. NMK S/65-66, S/68, S/120-123.

Remarks: The vouchers were not collected in the area close to Kakamega Forest but on the shores of the Yala River in the Siaya District. The Yala also crosses the southern part of the Kakamega Forest. In view of this, the occurrence of the species in the Kakamega area is likely.

Philothamnus hoplogaster (Günther, 1863)

1863 *Ahaetulla hoplogaster* Günther, Ann. Mag. Nat. Hist. 11 (3): 284.

Specimens examined. None.

Remarks: This taxon is only recorded from literature (Hughes 1985; Spawls et al. 2002).

Further data are not available.

Philothamnus nitidus Günther, 1863

1863 *Ahaetulla nitida* Günther, Ann. Mag. Nat. Hist. (3) 11: 283-287.

Specimens examined. NMK S/67, S/69.

Remarks: The vouchers were not collected in the area close to Kakamega Forest but on the shores of the Yala River in the Siaya District. The river crosses the southern part of the Kakamega Forest (see *P. heterolepidotus* above). After closer examination, NMK S/67 & S/69 were assigned to the subspecies *P. n. loveridgei* Laurent, 1960.

Psammophis mossambicus Peters, 1882

1882 *Psammophis mossambicus* Peters, Reise nach Mossambique, p. 122.

Specimens examined. NMK S/2316, S/2319; ZFMK 82049.

Key references: SPAWLS et al. 2002.

Remarks: SPAWLS et al. (2002) placed the eastern populations of *P. phillipsi* and *P. sibilans* in the synonymy of *P. mossambicus*. Examination of the type material of *P. mossambicus* support this decision but it has to be kept in mind that the earlier recognized *P. phillipsi* is a relatively small sized rainforest species with an entire anal scale (STERNFELD 1907; LOVERIDGE 1940; VILLIERS 1975; TAYLOR & WEYER 1958; DOUCET 1963; CHIPPAUX 2001). The voucher ZFMK 82049 was found inside Buyangu Village, basking on a small bush.

Psammophis phillipsi (Hallowell, 1844)

1844 *Coluber phillipsi* Hallowell, Proc. Acad. Nat. Sci. Philadelphia 1844: 169.

Specimens examined. NMK O/3603; ZFMK 82050.

Key references: CHIPPAUX 2001.

Remarks: These vouchers represent the first record of the species for Kenya. For the taxonomic assignment see *P. mossambicus*. SPAWLS *et al.* (2002) placed the eastern populations of *P. phillipsi* and *P. sibilans* in the synonymy of *P. mossambicus*. ZFMK 82050 was found 100 m away from a pond inside the primary forest of the Buyangu area. The second voucher was collected on the Buyangu Hill, a natural clearing inside the forest.

Fig. 21. *Psammophis phillipsi* from Kakamega Forest. Photo by Jörn KÖHLER.

Psammophis rukwae Broadley, 1966

1966 *Psammophis sibilans rukwae* Broadley, Arnoldia Rhod. 2 (36): 3.

Specimens examined. None.

Remarks: This taxon is only known from literature (SPAWLS et al. 2002). Further data are not available.

Fig. 22. *Thrasops aethiopissa* from Kakamega Forest. Photo by Philipp WAGNER.

Thrasops aethiopissa (Günther, 1862)

1862 *Rhamnophis aethiopissa* Günther, Ann. Mag. nat. Hist. (3) 9: 124-132.

Specimens examined. NMK O/3563; ZFMK 76045, 77290, 82032.

Additional specimens. CAS 147909, 152794.

Remarks: *T. aethiopissa* is a typical rain forest species whose East African populations are assigned to the subspecies *T. a. elgonensis* (LOVERIDGE, 1929) which is only known from the Mt. Elgon and Kakamega forests in Kenya. ZFMK 82032 was collected at daytime basking on a 20 cm high bush on a clearance of the Buyangu area. When threatened it displays typical defence behaviour similar to the boomslang.

Thrasops jacksonii Günther, 1895

1895 *Thrasops jacksonii* Günther, Ann. Mag. Nat. Hist. 15 (6): 523-529.

Specimens examined. MHNG 1.375.038-040, 042; ZFMK 66275-76, 68516.

Additional specimens. CAS 122295, 152795.

Remarks: Details on the vouchers are unknown..

***Toxicodryas blandingii* (Hallowell, 1844)**

1844 *Dipsas blandingii* Hallowell, Proc. Acad. Nat. Sci. Philad. 1844: 170.

Specimens examined. MHNG 1.356.058.

Additional specimens. CAS 150981-82.

Remarks: In Kenya it is only known from Kakamega Forest and the Serem area. Further data are not available.

***Toxicodryas pulverulenta* (Fischer, 1856)**

1856 *Dipsas pulverulenta* Fischer, Abhandl. Nat. Ver. Hamburg 3 (4): 81-116.

Specimens examined. None.

Additional specimens. CAS 122742.

Remarks: Further data are not available..

Atractaspididae Günther, 1858

***Polemon christyi* (Boulenger, 1903)**

1903 *Miodon christyi* Boulenger, Ann. Nat. Hist. (7) xii : 354.

Specimens examined. None.

Additional specimens. CAS 147905.

Remarks: Details on this voucher are unknown.

Elapidae Boie, 1827

***Dendroaspis jamesoni* Traill, 1843**

1843 *Elaps jamesoni* Traill, Edinburgh new. phil. J., 34 (67): 54.

Specimens examined. MHNG 1327.046-48; ZFMK 82036.

Additional specimens. CAS 122298-99.

Key references: Loveridge 1936.

Fig. 23. *Dendroaspis jamesoni kaimosae* from Kakamega Forest. Photo by Philipp Wagner.

Remarks: *D. jamesoni* is distributed from Ghana in the west to Kenya in the east and southwards to Angola. In Kenya, the subspecies *D. j. kaimosae* Loveridge, 1936 (with the type locality Kaimosi) is hitherto recorded from Kenya by vouchers from Kakamega Forest, and a sighting from Lolgorien, Mara Escarpment (Spawls et al. 2002). During the course of this study we found a voucher specimen (NHMW 28109) collected from Nakuru. ZFMK 82036 was found on the shore of the Isiukhu River in the northern part of the forest, basking on a horizontal branch at about midday.

***Elapsoidea loveridgei* (Parker, 1949)**

1949 *Elapsoidea sundevalli loveridgei* Parker, Zool. Verh. Leiden 6: 1-115.

Specimens examined. MHNG 1328.010; ZFMK 82001.

Additional specimens. CAS 152796.

Remarks: ZFMK 82001 was found in the morning after a rainy night; it was crossing the forest road near to the Buyangu gate. After examination of the vouchers they were assigned to the subspecies *E. l. multicincta* (Laurenti, 1956) however the nominate form *E. l. loveridgei* also occurs in Kenya east of the Rift Valley.

***Naja melanoleuca* Hallowell, 1857**

1857 *Naja haie* var. *melanoleuca* Hallowell, Proc. Acad. Nat. Sci. Philadelphia 1857: 61.

Specimens examined. NMK S/3980, S/3985; ZFMK 82045-47.

Additional specimens. CAS 122749, 122758.

Remarks: *N. melanoleuca* is the most common venomous snake in the Kakamega area. Snakes were found in several habitats and areas, e. g. inside the forest: near the Isiukhu Falls, near the Buyangu Gate, south of Udo's Campside, Yala River, Kaimosi fragment and Malava fragment; outside the forest (mostly juveniles) within Buyangu Village, Isecheno and Salazar Circuit (both sightings).

***Pseudohaje goldii* (Boulenger, 1895)**

1895 *Naia goldii* Boulenger, Ann. Mag. Nat. Hist. London 16 (6): 34.

Specimens examined. NMK S/3366

Remarks: This species has a wide but disjunct distribution from Togo (Hughes & Barry 1969) in the west to Kenya in the east and southwards to Angola and Namibia (Obst et al. 1988). In Kenya it is only known from Kakamega Forest but the occurrence in the Mt. Elgon forests is possible. Further data are not available.

Fig. 24. *Atheris hispida* from Kakamega Forest. Photo by Philipp WAGNER.

Viperidae LAURENTI, 1768

Atheris hispida LAURENT, 1955

1955 *Atheris hispidus* LAURENT, Rev. Zool. Bot. Afr. 51: 138.

Specimens examined. MHNG 2236.23; NMK O/1648; NMZB-UM 5317; ZFMK 66374, 82024-26.

Additional specimens. CAS 141750, 147906, 147908.

Remarks: This bush viper is only known in Kenya from the Kakamega Forest, where it is sympatrie with *A. squamigera*. SPAWLS et al. (2002) stated that *A. hispida* inhabits higher and drier bushes than *A. squamigera* whieh does not seem to be the ease in Kakamega Forest, where *A. hispida* was found mostly in low elevation of a maximum of 80 cm. SPAWLS et al. (2002) also reported that the taxon was never eolleeted in Kakamega since the early 1990´s, so that this reeord is the rediscovery of the speeies there. Most vouehers were eolleeted in the northern part of the forest. Only CAS 122747 was found in the Kaimosi fragment.

Atheris squamigera (Hallowell, 1854)

1854 *Echis squamigera* Hallowell, Proc. Acad. Nat. Sci. Philadelphia 1854: 193.

Specimens examined. PW 158 & 163 (now part of the NMK colleetion); ZFMK 64337-42, 81214, 82027, 82029.

Additional specimens. CAS 122744-46, 122748, 147902-03, 148629, 150983-84, 153468; NMZB-UM 5393, 6518-19.

Remarks: *A. squamigera* is a eommon viper inside Kakamega Forest, where it oeeurs sympatrieally with *A. hispida*. Most vouehers were eolleeted in the northern part of the forest. Only DREWES colleeted two speeimens 1969 near Kaimosi in the southern part of the forest. *A. squamigera* has a disjunet distribution from Ghana (HUGHES & BARRY 1969) in the west to Kenya in the east, southwards to Angola and Tanzania. Additionally studies may demonstrate differenees between the populations. In Kenya *A. squamigera* is, with two exeeptions, only known from Kakamega Forest. Two reeords are from outside the forest: one speeimen from Chemilil and one sighting from the Soit Ololol Esearpment (SPAWLS et al. 2002). Speeimens eolleeted in this study were exelusively found near water bodies in the Buyangu area. They were found by hunting by torehlight and basking on small bushes or in leaf litter at daytime.

Fig. 25. *Atheris squamigera* from Kakamega Forest. Photo by Jörn KÖHLER.

Bitis gabonica (Dumeril, Bibron & Dumeril, 1854)

1854 *Echidna gabonica* Dumeril, Bibron & Dumeril, Erpét. Gén. 7: 1428.

Specimens examined. NMK S/2904

Remarks: Details on this reeord are unknown, but several sightings of the taxon are reported from the grassland near the entranee of Udo´s Campsite and from the Salazar Cireuit. In Kenya this taxon is only known from the Kakamega and Nandi areas.

Bitis nasicornis (Shaw, 1802)

1802 *Coluber nasicornis* Shaw, Nat. Misc. 3, pl. 94.

Specimens examined. NMK S/3978; ZFMK 82030-31.

Additional specimens. CAS 150989, 150990.

Remarks: Like the previous species also *B. nasicornis* was often found and sighted on the roads of the Salazar Cireuit. Also this taxon oeeurs within Kenya only at the Kakamega and Nandi areas. Two vouehers (ZFMK 82030 and 82031) were found near the Isiukhu Falls. The stomaeh of ZFMK 82031 eontained (Muridae: *Lophuromys laticeps*) as prey item.

***Causus lichtensteini* (Jan, 1859)**

1859 *Aspideplaps lichtensteini* Jan, Rev. & Mag. Zool. 1859: 511.

Specimens examined. NMK S/2499; ZFMK 82033-34.

Additional specimens. CAS 154579.

Remarks: This forest species has a wide distribution from Côte d'Ivoire in the west (RÖDEL & MAHSBERG 2000) to Kenya in the east and southwards to Zambia (BROADLEY et al. 2003). In Kenya this taxon is only known from the Kakamega and Nandi areas. All vouchers of the study are juveniles and were collected after rainfall in the evening in the grassland near Udo's Campsite and in the morning at the forest border and in Guava bushland in the Buyangu area.

***Causus resimus* (Peters, 1862)**

1862 *Heterophis resimus* Peters, Monatsber. Akad. Wiss. Berlin 1862: 271-279.

Specimens examined. None.

Remarks: This taxon is only recorded from literature (PITMAN 1974). Further data are not available.

Testudines

Pelomedusidae Cope, 1868

***Pelomedusa subrufa* (Lacépède, 1788)**

1788 *Testudo subrufa* Lacépède, Hist. nat. Quadrup. Ovip. Synops. Method. 1: 173, pl. 12.

Specimens examined. NMK C/53; ZFMK 81951.

Remarks: Interestingly this typical savannah species was also found inside the forest. Several adult specimens were found inside a pond in the Buyangu area. Juveniles were found in smallest water bodies inside and outside the forest e. g. in small temporary stream on the Buyangu Hill. But *P. subrufa* was also found in the surrounding area, in fish and garden ponds. Specimens were also sighted on the shores of the Isiukhu River, but not at the Yala River.

4.2. KEY TO THE SPECIES

AMPHIBIANS

1	- Tongue absent.	**PIPIDAE** *Xenopus victorianus*
	- Tongue present.	**2**
2	- Upper jaw toothless	**BUFONIDAE (5)**
	- Upper jaw with teeth.	**3**
3	- Fine dorsal skin ridge along midline.	**ARTHROLEPTIDAE (6)**
	- Dorsal skin ridge absent.	**4**
4	- Last phalanx of fingers out of alignment.	**HYPEROLIIDAE (7)**
	- Last phalanx of fingers not out of alignment.	**RANIDAE (10)**
5	- Parotoid glands distinct and raised.	*Amietophrynus kisoloensis*
	- Parotoid glands indistinct and flattened.	*Amietophrynus maculatus*
6	- Heels (tarsus) black with thin white border in males.	*Leptopelis mackayi*
	- Heels lacking this pattern in males.	*Leptopelis* aff. *bocagii*
7	- Pupil horizontal to round.	***Hyperolius***
	- Pupil vertical.	**8**
8	- Vomerine teeth absent.	***Afrixalus* (9)**
	- Vomerine teeth present.	***Kassina*** *Kassina senegalensis*
9	- Thin pale marking from the lower back around a dark rectangular patch anteriorly.	*Afrixalus osorioi*
	- This particular pattern absent.	*Afrixalus quadrivittatus*

10	- Vomerine teeth absent.	***Phrynobatrachus* (18)**
	- Vomerine teeth present.	**11**
11	- Vomerine projections between internal nostrils.	**12**
	- Vomerine projections abutting onto anterior margins of internal nostrils	***Ptychadena* (14)**
12	- Transverse skin groove behind the eyes.	*Hoplobatrachus occipitalis*
	- Transverse skin groove absent.	**13**
13	- Golden to brownish band from snout to vent.	*Amnirana albolabris*
	- Band absent.	*Afrana angolensis*
14	- Pale triangle on snout.	**15**
	- Pale triangle absent.	**16**
15	- Distance from nostril to snout greater than internarial distance.	*Ptychadena oxyrhynchus*
	- Distance from nostril to snout not more than internarial distance.	*Ptychadena anchietae*
16	- 2 to 2 1/3 phalanges of fourth toe free of web.	*Ptychadena mascariensis*
	- 2.5 phalanges or more on fourth toe free of web.	**17**
17	- Back of thigh spotted or mottled.	*Ptychadena porossima*
	- Back of thigh with and dark longitudinal bands.	*Ptychadena taenioscelis*
18	- Tympanum visible.	**19**
	- Tympanum not visible.	*Phrynobatrachus* aff. *mababiensis*
19	- Discs on fingers absent.	*Phrynobatrachus natalensis*
	- Discs on fingers very small, only swellings.	*Phrynobatrachus graueri*

Terrapins

1	Only terrapin in Kakamega area	*Pelomedusa subrufa*

Lizard families

1	- Head dorsally covered with granular, small and irregular scales.	**2**
	- Head dorsally covered with large scales.	**5**
2	- Eyelids absent.	**Gekkonidae**
	- Eyelids present.	**3**
3	- Head much wider than neck, with clusters of spiny scales around the ear; tongue short and broad.	**Agamidae**
	- Head only slightly wider than neck; tongue long and slender.	**4**
4	- Tongue very long and telescopic; digits fused together.	**Chamaeleonidae**
	- Tongue long and forked; digits separate.	**Varanidae**
5	- Dorsal and ventral scales similar, mostly smooth.	**Scincidae**
	- Ventral scales rectangular, larger than dorsals.	**6**
6	- Lateral granular fold present.	**Lacertidae**
	- Lateral granular fold absent.	**Cordylidae** *Chamaesaura anguina*

Gekkonidae

1	- Pupil round.	2
	- Pupil vertieal.	*Hemidactylus mabonia*
2	- Claws on digits exeept thumb present.	*Lygodactylus guttnralis*
	- Toes with a distinetive angle at the last or last two joints.	3
3	- Subeaudals with a eontinous median row; 9–12 preanal pores.	*Cnemaspis africana*
	- Subeaudals with a diseontinous median row; 6–8 preanal pores.	*Cnemaspis elgonensis*

Scincidae

1	- Eye eovered by skin.	*Feylinia currori*
	- Eye visible.	2
2	- Lower eyelid with a large transparent dise.	5
	- Lower eyelid without a transparent dise.	3
3	- 2–3 digits on forelimb, 3 on hindlimb.	*Ennecia anchietae*
	- 4 or 5 digits on both limbs.	4
4	- Supranasals present, broadly in eontaet.	*Lepidothyris* aff. *fernandi*
	- Supranasals absent, if present widely separated.	*Afroablepharus wahlbergii*
5	- Seales on feet usually non-spinose and smooth.	6
	- Seales on feet keeled and spinose.	*Trachylepis striata*
6	- Midbody seale rows number 24–26.	*Trachylepis megalura*
	- Midbody seale rows number 28 or more.	7
7	- Midbody seale rows number 32–42; 5 blaek-bordered longitudinal stripes, blue tail in juveniles.	*Trachylepis quinquetaeniata*
	- Midbody seale rows number 30-38, without sueh stripes.	*Trachylepis maculilabris*

Lacertidae

1	- Midbody seale rows number 18–24.	*Adolfus africanus*
	- Midbody seale rows number more than 35.	*Adolfus jacksoni*

Agamidae

1	- Interparietal seale not larger than the adjoining head seales.	*Acanthocercus atricollis*
	- Interparietal seale larger than the adjoining head seales.	*Agama kaimosae*

Chamaeleonidae

1	- Tail short and non-prehensile.	*Rhampholeon boulengeri*
	- Tail long and prehensile.	2
2	- Body sealation heterogeneous.	4
	- Body sealation homogeneous.	3
3	- Oeeipital dermal lobes absent.	*Chamaeleo laevigatus*
	- Oeeipital dermal lobes present.	*Chamaeleo gracilis*
4	- Long gular erest; parietal erest very high.	*Chamaeleo hoehnelii*
	- Low erest; one or two blaek eoloured throat grooves.	*Chamaeleo ellioti*

SNAKE FAMILIES

1	- Eye covered by skin.	TYPHLOPIDAE
	- Eye not covered by skin.	2
2	- No poison fangs in the front upper jaw, pupil usually round.	COLUBRIDAE
	- Poison fangs in the front upper jaw present	3
3	- Poison fangs relatively short, immobile.	ELAPIDAE
	- Poison fangs mobile or folding.	4
4	- Eye large, head dorsum covered with small scales (exeept *Causus*).	VIPERIDAE
	- Eye tiny, head dorsum with large symmetrical scales.	ATRACTASPIDIDAE

TYPHLOPIDAE

1	- Second supralabial overlapping preocular scale.	*Typhlops angolensis*
	- Second supralabial overlapping ocular scale.	*Typhlops lineolatus*

ELAPIDAE

1	- Midbody scales rows number 13, always with broad bands.	*Elapsoidea loveridgei*
	- Midbody scale rows number more than 13.	2
2	- 3 preoculars scales, head long and narrow.	*Dendroaspis jamesoni*
	- 1 or 2 preocular scales.	3
3	- Midbody scale rows number 15 (Rarely 17).	*Pseudohaje goldii*
	- Midbody scale rows number 19.	*Naja melanoleuca*

VIPERIDAE

1	- Pupil round, 9 large symmetrical scales on top of the head.	5
	- Pupil vertical, many scales on top of the head.	2
2	- Subcaudal scales paired.	3
	- Subcaudal scales single.	4
3	- Long horns on the snout of the adults.	*Bitis nasicornis*
	- No or only short horns on the snout.	*Bitis gabonica*
4	- Scales strongly lanceolate on the head and front part of the body.	*Atheris hispida*
	- Scales not lanceolate.	*Atheris squamigera*
5	- Subcaudal scales single.	*Causus lichtensteini*
	- Subcaudal scales paired.	*Causus resimus*

COLUBRIDAE

1	- No venom-delivery fangs in the upper jaw.	8
	- One or more pairs of venom-delivery fangs in the upper jaw.	2
2	- Pupil vertical.	3
	- Pupil round.	5
3	- Ventrals number 141–183.	*Crotaphopeltis hotamboeia*
	- Ventrals number 195–270.	4
4	- Midbody scale rows number 19.	*Toxicodryas blandingii*
	- Midbody scale rows number 21–25.	*Toxicodryas pulverulenta*

5	- Dorsal scales keeled.	*Dispholidus typus*
	- Dorsal scales smooth.	**6**
6	- First 5 infralabials usually in contact with the anterior sublinguals.	*Psammophis rukwae*
	- First 4 infralabials usually in contact with the anterior sublinguals.	**7**
7	- Anal scale divided.	*Psammophis mossambicus*
	- Anal scale single.	*Psammophis phillipsi*
8	- Dorsal scales smooth.	**9**
	- Dorsal scales keeled.	**20**
9	- Nostril (naris) located with a divided or semi-divided nasal.	**10**
	- Nostril (naris) located with an entire nasal.	**18**
10	- Anal scale single.	*Lamprophis fuliginosus*
	- Anal scale divided.	**11**
11	- Midbody scale rows number 13–15, reducing to 11 posteriorly.	**12**
	- Midbody scale rows number 15–21, if 15 not reducing posteriorly.	**17**
12	- A pair of enlarged occipital scales.	*Thrasops aethiopissa*
	- No enlarged occipital scales.	**13**
13	- Anal scale single.	*Philothamnus carinatus*
	- Anal scale divided.	**14**
14	- Subcaudal scales rounded or angular, not keeled.	**15**
	- Subcaudal scales sharply angular, keeled.	*Philothamnus nitidus*
15	- Ventral scales 168-194, no concealed spots on dorsal scales.	*Philothamnus heterolepidotus*
	- Ventral scales 138-179, cryptic pattern with spots on dorsal scales.	**16**
16	- Subcaudal scales 60–104, flanks often blue.	*Philothamnus hoplogaster*
	- Subcaudal scales 88–128, no blue on the body.	*Philothamnus battersbyi*
17	- Subcaudal scales 130–155.	*Thrasops jacksoni*
	- Subcaudal scales less than 130.	*Natriciteres olivacea*
18	- Midbody scale rows number 15, not reduced before the vent.	*Lycophidion ornatum*
	- Midbody scale rows number 15, reduced before the vent.	**19**
19	- Ventral scales 153–173.	*Lycophidion depressirostre*
	- Ventral scales 170–221.	*Lycophidion capense*
20	- Midbody scale rows number 15.	**21**
	- Midbody scale rows number 21–27.	**22**
21	- Ventral scales 193–244.	*Mehelya capensis*
	- Ventral scales 150–175.	*Hapsidophrys lineatus*
22	- Fewer than 80 pattern cycles between nape and base of tail.	*Dasypeltis scabra*
	- More than 80 pattern cycles between nape and base of tail or uniform black.	*Dasypeltis atra*

5. DISCUSSION

The composition of the herpetological community is typical for a forest fragment. It includes typical forest species but also some ubiquitous and bushland species. From the 22 lizard species recorded, only seven are true forest species, and for five species Kakamega Forest is the only Kenyan locality. The situation for snakes is nearly the same: from 26 species recorded, 14 are forest dwellers; of these, 12 again have their only Kenyan occurrence here. In addition, three ubiquitous species are also confined to Kenya to the Kakamega area. The species richness of snakes in this forest and its environs is remarkable on an African scale (for comparative species numbers of African snake communities see Böhme (1993), Herrmann et al. (2005b) and Rödel & Mahsberg (2000). The richness of forest snake species also argues for a relatively intact status of the main forest fragment which seems to be still relatively undisturbed, enabling survival for many forest species.

However, the remaining smaller fragments of Kakamega Forest have drastically reduced species richness as compared to the main fragment. From Malaba, the least intact fragment, only two forest species, viz. the toad *Amietophrynus kisoloensis* and the forest cobra *Naja melanoleuca* have been recorded. The Kisere fragment is known to have only one additional forest species, viz. *Rampholeon boulengeri*, but more forest species might be expected in this protected forest relict. The Kaimosi fragment, finally, is home for two bushviper (*Atheris*) species and the green mamba (*Dendroaspis jamesoni kaimosae*). This drastic decrease in numbers of forest-dwelling species underlines the need of effective conservation measures in order to stop any further deforestation and forest fragmentation.

Bennun & Njoroge (1999) characterised Kakamega Forest as a mid-altitude tropical rainforest. This view is supported by the occurrence of the (sub)montane tree fern *Cyathea manniana* which is currently found only in the Nandi Escarpment forests which lie a few hundred meters higher than Kakamega Forest. The same can be concluded from the altitudinal distribution of the forest reptiles: of 21 forest species, 18 have a mid-altitudinal distribution, but this group is dominated by 11 species assignable to lowland forests. The assignment to a lowland rather than to a montane forest is also corroborated by the bird fauna. Bennun & Njoroge (1999) found 194 forest species of which 40 were typical members of the Guineo-Congolian forest block. Of 134 typical Congo Basin bird species as defined by Chapin (1932), 37 occur in Kakamega Forest. This amount increases to 57 out of 125 when the species from lowland secondary forests and forest clearings are also taken into account. Studies of Kakamega's Lepidoptera yielded similar results (Carcasson 1964), and also the reptiles support the view of a mid-altitude rainforest dominated by lowland species.

Several authors regarded Kakamega Forest as the easternmost outlier of the Guinea-Congolian rainforest block (Zimmermann 1972; Drewes 1976; Hamilton 1976; Schiotz 1976; Kokwaro 1988; Vonesh 2001; Köhler 2004; Clausnitzer 2005; Schick et al. 2005). The last mentioned authors have analysed the distribution of the 24 amphibian species recorded so far from Kakamega Forest. They assigned eight species to their distribution pattern type "East African Highland", seven were widely distributed forms including other parts of the equatorial rainforests and even parts of southern Africa. Five species show a typical "arid corridor" distribution (see Poynton 1995; P. Wagner, unpubl. data), and only four species (*Amnirana albolabris, Afrixalus osorioi, A. quadrivittatus, Hyperolius cinnamomeoventris*) exhibit a typical Guinea-Congolian distribution pattern. In this regard, the amphibian fauna of Kakamega gives a less clear picture of the geographic assignment of this forest as compared with the reptilian fauna. Comparing the latter community with that of other African rainforests (Wagner et al. submitted.), it turns out that it shares many more species with the Bwindi and Kibale Forests in Uganda, and even with the far distant Ziama Forest in Guinea, West Africa than e. g. with the Kenyan coastal Arabuko-Sokoke Forest or even the Eastern Arc montane forests. The analysis of Kakamega's reptile fauna, therefore, clearly argues for a Guinea-Congolian assignment of the relictual Kakamega Forest.

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Appendix

Ecological characteristics of the 58 reptiles recorded within the area of the Kakamega Forest

Taxon	Abun[a]	Loc[b]	Diet[c]	Hab[d]	Act[e]	Micro[f]	Alt[g]	Distr.[h]
Testudinae								
Pelomedusa subrufa	U	2	I,A,B	W,L	D	Aq	0–1600	SSA
Sauria, Gekkonidae								
Cnemaspis africana	I	2	I	Fl	N	A	0–2000	EA
Cnemaspis elgonensis	I	2	I	Fl	N	A	1200–2200	EA
Hemidactylus mabouia	C	1	I	F	N	A, AP	0–2500	SSA
Lygodactylus gutturalis	R	2,5	I	FE	DN	A	700–2000	EA
Agamidae								
Acanthocercus atricollis	C	1	I	A, F	D	A, AP	0–2400	NEA
Agama kaimosae	R	7	I	L	D		1800	K
Chamaeleonidae								
Chamaeleo ellioti	C	1,2,3,4,6,7, 10,11,13	I	A,FE, F,Fl	D	AL	1500–2800	CE
Chamaeleo gracilis	I	10	I	L	D	AL	0–1600	WE
Chamaeleo laevigatus	I	12	I	L	D	AL	1000–1500	CE
Rhampholeon boulengeri	U	2, 16	I	Fl, FE	D	L, AL	1400–2000	CE
Scincidae								
Afroablepharus wahlbergii	R	9, 12	I	A,F,L	D	L,T	0–2200	CS
Eumecia anchietae	U	1,3	I	L, F	D	T	—	EA
Feylinia currori	S	2	I	FE	?	B	—	MA
Lepidothyris aff. *fernandi*	R	2	I	FE, Fl		L, T	600–2100	CE
Trachylepis maculilabris	R	7	I	A, FE	D	L, T	0–2300	SSA
Trachylepis megalura	R	6,7	I	A, FE	D	L, T	1500–3000	CS
Trachylepis quinquetaeniata	C	13	I	L	D	T	200–1600	NA
Trachylepis striata	C	1,5	I	A, FE, F	D	L, T	0–2300	MA
Lacertidae								
Adolfus africanus	I	2	I	Fl, FE	D	A, L	580–1200	CE
Adolfus jacksoni	C	1,5	I	FE, A, F	D	T, L	450–3000	CE
Cordylidae								
Chamaesaura anguina	R	14	I	L	D	T	1200–3000	MA
Varanidae								
Varanus niloticus	R	9	M,Ga,F, A,B,I	A, F, L	D	T	0–1600	SSA
Serpentes, Typhlopidae								
Typhlops angolensis	R	7	I	A, FE	N	B	—	CE
Typhlops lineolatus	U	2,5	I	F, FE	N	B	—	MA
Colubridae								
Crotaphopeltis hotamboeia	R	14	A	FE, A	N	T, Aq	0–2500	CE
Dasypeltis atra	U	2,14	B	Fl, FL,L	N	T, A	1000–2800	CE
Dasypeltis scabra	U	7	B	Fl, FL, L, F	N	T, A	0–2600	SSA
Displolidus typus	R		A,Ro,B,E	FE, L, F	D	A, AL, AH	0–2200	SSA
Hapsidophrys lineatus	I	2,14	A	FE, Fl	DN?	A	700–1800	WE
Lamprophis fuliginosus	C		Ro	A, F	N	T	0–2400	WE
Lycophidion capense	R	7	E,S	L, A	N	T	0–2400	CE
Lycophidion depressirostre	R	7	E,S	L	N	T	—	EA
Lycophidion ornatum	I	2	E	Fl, FE	N	T	700–2700	CE
Mehelya capensis	R	14	E,S	FE, F, L	N	T	0–2000	
Natriciteres olivacea	R	4	A,F	FE, A	DN	T, Aq	0–2200	WE
Philothamnus battersbyi	U	1,14	A,F	F, W, L	D	AL	1300–1800	EA
Philothamnus carinatus	R	7	A	Fl, FE	DN?	A	0–2300	WE
Philothamnus heterolepidotus	R	15	A	L	D	A	600–2000	WE
Philothamnus hoplogaster	R	14, 10	A,F	L, W	D	A	0–1800	OS
Philothamnus nitidus	R	15, 14	A	FE, FL	D	A	medium	CE
Psammophis mossambicus	I	14,1	S,E,A,B,Ro	L, F, A	D	T	0–2500	OS
Psammophis phillipsi	I	2	M,E,A,B	FE	D	A	medium	WE
Psammophis rukwae	R	7,8	E,S	L, F, A	D	T	medium	WE
Thrasops aethiopissa	U	2	A	Fl, FE	DN?	A	medium	EA

Taxon	Abun[a]	Loc[b]	Diet[c]	Hab[d]	Act[e]	Micro[f]	Alt[g]	Distr.[h]
Thrasops jacksonii	U	2,14	M,E,B,A	FE, FI, A	DN	A	600–2400	CE
Toxicodryas blandingii	R	14	B,E,A,M	FE, FI	DN	A	700–2200	WE
Toxicodryas pulverulenta	R	7	Ro,E	FI, FE	N	A	medium	WE
Atractaspididae								
Polemon christyi	R	14	E	FE, FI, A	N?	B	600–1700	CE
Elapidae								
Dendroaspis jamesoni	U	14,2	Ro,B	FE, FI, A	N	A, T	600–2200	CE
Elapsoidea loveridgei	I	14,2	S,E,A,Ro	FE, L, F	N	T	600–2200	CE
Naja melanoleuca	C	14,11	A,F,S,E,M,B	FE, FI	DN	T	0–2500	SSA
Pseudohaje goldii	I	14	A,F	FI	N	A	600–1700	WE
Viperidae								
Causus lichtensteini	U	14,5	A	FI, FE	DN	T	500–2100	WE
Causus resimus	R	7	A	FE, L, F	DN	T	0–1800	WE
Atheris hispida	U	2,14	Ga,A,Ro	FE, W	N	A	900–2400	CE
Atheris squamigera	U	2,4,14,13,7	E,S,A,M	FI, FE	N	A	700–1700	WE
Bitis nasicornis	U	4,3,14	M	FI, FE,	N	T, AL	600–2400	CE
Bitis gabonica	I	14	M	FE, L	N	T	0–2100	CE

Remarks:

a - **Abun**dance, based on the number of records: C = very common; U = common, often sighted within the study and many vouchers collected; I = rare, only seen once or twice, only single vouchers; R = rare, only from literature or single vouchers; E= proposed occurrence.

b - **Loc**alities of vouchers, literature records and sightings: 1= Buyangu Village; 2= Buyangu forest; 3= Salazar Circuit; 4= Isiukhu River; 5= Udo's Campside; 6= Liranda Hill; 7=Kaimosi; 8= reported by Spawls *et al.* 2002; 9= reported by Loveridge; 10= Nandis; 11= Malava; 12= vicinity of Kakamega Forest; 13 = Buyangu clearing; 14= Kakamega Forest in general; 15= Yala River; 16= Kisere.

c - **Diet**, A= amphibians, I= insects, Ga= gastropods, F= fishes, E= lizards, S= snakes, B= birds, M= mammals, Ro = rodents.

d - **Hab**itats, FI= forest; FE= clearings or forest edges; A= agricultural land; F= Farmland, residential area and gardens; W= waters or shores; L= Bushland and open landscape.

e - **Act**ivity, D = day active; N = night active; DN = diurnal.

f - **Micro**habitat, Aq= aquatic; B= burrowing; L= leaf litter; T= terrestrial; A= arboricol; AL= arboricol in low vegetation; AH= arboricol in trees; AP= anthropophilous.

g - **Alt**itude in metres.

h - **Distr**ibution, East to west distribution in Africa: key references: Pitman (1974), Spawls *et al.* (2002), Broadley & Howell (1991), Uetz (2002) and Chippaux (2001): CE= central to eastern Africa; CS= central to southern Africa; EA= East Africa; K= Kenya; MA= middle of Africa; NA= northern Africa; NEA= north-eastern Africa; OS= East- to South Africa; SSA= Sub-Saharan Africa; WE= West- to East Africa.